What is claimed is:

1. A reticle manipulator for handling a circular reticle having a peripheral handling zone, the reticle manipulator comprising:

a movable member; and

a reticle-support member having a trunk portion coupled to the movable member and a distal portion extending from the trunk portion, the trunk portion and distal portion defining respective vacuum ports situated and configured to engage, with vacuum suction, three respective locations in the handling zone so as to hold the reticle to the reticle-support member without contacting the patterned area.

2. The reticle manipulator of claim 1, wherein:

the reticle-support member is configured as a fork, of which the distal portion is defined by two tines that extend from the trunk portion; and

the tines define respective vacuum ports.

3. The reticle manipulator of claim 1, wherein the movable member is a first arm having a distal end to which is coupled the trunk portion of the reticle-support member.

4. The reticle manipulator of claim 3, further comprising a base, wherein the first arm has a proximal end connected to the base in a manner allowing the first arm to be robotically actuated relative to the base so as to cause the distal end of the first arm to move relative to the base.

5. The reticle manipulator of claim 3, further comprising a second arm having a proximal end and a distal end, wherein the proximal end of the second arm is connected to the distal end of the first arm, the distal end of the second arm is

connected to the trunk portion of the reticle-support member, and the second arm is configured at least to pivot relative to the first arm.

6. The reticle manipulator of claim 1, wherein the reticle-support member is configured to engage the locations, in the handling zone, on the under-surface of the reticle.

7. The reticle manipulator of claim 1, wherein the vacuum ports are situated equidistantly from each other.

8. The reticle manipulator of claim 1, wherein:

each vacuum port defines a respective vacuum aperture; and

each vacuum aperture is elongated in a manner following an outer-edge curvature of the reticle.

9. The reticle manipulator of claim 1, wherein:

the reticle-support member is configured as a fork, of which the distal portion is defined by two tines that extend from the trunk portion;

the vacuum port on each tine is situated near a distal end of the respective tine; and

the vacuum port on the trunk portion is situated at an edge of the trunk portion facing the reticle and situated between the tines.

10. The reticle manipulator of claim 9, wherein the vacuum ports are situated equidistantly from each other.

11. The reticle manipulator of claim 1, wherein each vacuum port is surrounded by a respective lip presenting a respective reticle-contact surface that

contacts the respective location in the handling zone whenever the reticle is being held to the reticle-support member.

12. The reticle manipulator of claim 1, wherein:

the reticle-support member is configured as a fork, of which the distal portion is defined by two tines that extend from the trunk portion; and

the tines as extending from the trunk portion define a U-shaped profile to the fork.

13. The reticle manipulator of claim 1, wherein:

the trunk portion and distal portion of the reticle-support member define a recessed surface that provides a cradle in which the reticle fits whenever the reticle is being held by the reticle-support member;

the vacuum ports are defined in the recessed surface; and

each vacuum port is surrounded by a respective lip presenting a respective reticle-contact surface that contacts the respective location in the handling zone whenever the reticle is being held to the reticle-support member, the reticle-contact surface being elevated relative to the recessed surface.

14. The reticle manipulator of claim 13, wherein:

the reticle-support member is configured as a fork, of which the distal portion is defined by two tines that extend from the trunk portion; and

the trunk portion includes a projection extending therefrom that defines, in addition to the respective vacuum ports defined in each tine, the third vacuum port.

15. The reticle manipulator of claim 14, wherein:

the projection defines a recessed surface that, together with the recessed surfaces of the tines, collectively define the cradle in which the reticle fits whenever the reticle is being held by the fork;

the respective vacuum port defined by the projection is defined in the recessed surface of the projection; and

the vacuum port in the projection is surrounded by a lip presenting a respective reticle-contact surface that contacts the respective location in the handling zone whenever the reticle is being held to the fork, the reticle-contact surface being elevated relative to the recessed surface.

16. The reticle manipulator of claim 1, wherein the trunk portion and distal portion of the reticle-support member define respective side-wall escarpments situated so as to engage a respective portion of an edge of the reticle whenever the reticle is being held to the reticle-support member.

17. The reticle manipulator of claim 16, wherein:

the reticle-support member is configured as a fork, of which the distal portion is defined by two tines that extend from the trunk portion;

the side-wall escarpments are adjacent respective recessed surfaces of the tines and trunk portion;

the respective vacuum ports defined by each of the tines and trunk portion are defined in the respective recessed surfaces; and

each vacuum port is surrounded by a respective lip presenting a respective reticle-contact surface that contacts the respective location in the handling zone whenever the reticle is being held to the fork, each reticle-contact surface being elevated relative to the respective recessed surface so as to prevent the reticle from contacting the recessed surfaces.

18. The reticle manipulator of claim 16, wherein each of the side-wall escarpments has a radius substantially equal to a radius of the circular reticle.

19. The reticle manipulator of claim 1, wherein the movable member is robotically actuatable in each of X-, Y-, and Z-directions relative to the base.

20. The reticle manipulator of claim 1, wherein:

the handling zone has a first portion and a second portion;

the vacuum ports in the distal portion are situated so as to engage respective locations in the first portion of the handling zone; and

the vacuum port in the trunk portion is situated so as to engage a respective location in the second portion of the handling zone.

21. A reticle-manipulation system, comprising:

a first reticle station; and

a reticle manipulator for handling a circular reticle, having a peripheral handling zone, relative to the first reticle station, the reticle manipulator comprising (a) a first arm having a distal end, and (b) a reticle-support member having a trunk portion coupled to the distal end of the first arm and a distal portion extending from the trunk portion, the trunk portion and distal portion defining vacuum ports situated and configured to engage, with vacuum suction, three respective locations in the handling zone so as to hold the reticle to the reticle-support member without contacting the patterned area as the reticle manipulator picks up a reticle from the first station or places a reticle on the first station.

22. The system of claim 21, wherein the reticle manipulator further comprises:

a base, wherein the first arm has a proximal end connected to the base in a manner allowing the first arm to be robotically actuated relative to the base so as to cause the distal end of the first arm to move relative to the base; and

a second arm having a proximal end and a distal end, wherein the proximal end of the second arm is connected to the distal end of the first arm, the distal end of the

second arm is connected to the trunk portion of the reticle-support member, and the second arm is configured at least to pivot relative to the first arm.

23. The system of claim 21, further comprising a second reticle station reachable by the reticle-support member of the reticle manipulator such that the reticle-support member, as moved by the first arm, can pick up a reticle from the second station or place a reticle on the second station.

24. The system of claim 21, wherein the first and second stations are situated at 90° relative to each other.

25. The system of claim 21, wherein the first station comprises a base and three reticle-contact pins projecting from the base such that, as the reticle manipulator places a reticle on the first station, the reticle is placed on the three reticle-contact pins that contact the handling zone of the reticle and support the reticle in a tripod manner.

26. The system of claim 25, wherein the reticle-contact pins are situated on the base equi-angularly and equi-distantly relative to each other.

27. The system of claim 25, further comprising a respective stop pin situated outboard of the each reticle-contact pin so as to be situated adjacent a respective location on an edge of the reticle whenever the reticle is resting on the reticle-contact pins.

28. The system of claim 25, wherein the reticle-support member has a width dimension sufficient to allow the fork to be inserted between two of the three reticle-contact pins without contacting the reticle-contact pins.

29. A microlithography system that utilizes a circular reticle having a peripheral handling zone, the system comprising:

an optical column containing a reticle stage;

a reticle-holding chamber connected to the optical column; and

a reticle manipulator situated relative to the reticle-holding chamber, the reticle manipulator comprising (a) a first arm having a distal end, and (b) a reticle-support member having a trunk portion, coupled to the distal end of the first arm, and a distal portion extending from the trunk portion, the trunk portion and distal portion defining vacuum ports situated and configured to engage, with vacuum suction, three respective locations in the handling zone so as to hold the reticle to the reticle-support member without contacting the patterned area as the reticle manipulator picks up a reticle from the reticle-holding chamber or places a reticle in the reticle-holding chamber.

30. The microlithography system of claim 29, further comprising a reticle-alignment chamber connected to the reticle-holding chamber, wherein the reticle manipulator is configured to move a reticle from the reticle-alignment chamber to the reticle-holding chamber.

31. The microlithography system of claim 30, wherein the reticle manipulator is situated between the reticle-alignment chamber and the reticle-holding chamber.

32. The microlithography system of claim 29, wherein at least the reticle-holding chamber comprises a reticle station that comprises a base and three reticle-contact pins projecting from the base such that, as the reticle manipulator places a reticle on the station, the reticle is placed on the three reticle-contact pins that contact the handling zone of the reticle and support the reticle in a tripod manner.

33. A method for handling a circular reticle having a peripheral handling zone, the method comprising:

placing a reticle-support member relative to the reticle such that three vacuum ports of the reticle-support member contact respective locations in the handling zone;

applying a vacuum, relative to an ambient atmosphere in which the reticle is located, to the vacuum ports so as to adhere the reticle to the reticle-support member;

moving the reticle-support member so as to displace the reticle, adhering to the reticle-support member, to a reticle station; and

placing the reticle at the reticle station by releasing the vacuum.

34. The method of claim 33, wherein the first station comprises a base and three reticle-contact pins projecting from the base such that, as the reticle manipulator places a reticle on the first station, the reticle is placed on the three reticle-contact pins that contact the handling zone of the reticle and support the reticle in a tripod manner.

35. The method of claim 33, wherein:

the reticle has a patterned area; and

reticle-support member holds the reticle without contacting the patterned area.

36. The method of claim 33, wherein:

the reticle-support member is configured as a fork having a trunk portion and two tines; and

the trunk portion and each of the tines defines a respective vacuum port that contacts the respective location in the handling zone during the placing step.

37. The method of claim 33, wherein the vacuum ports contact the respective locations in the handling zone without the reticle-support member contacting any other part of the reticle except an edge of the reticle.

38. The method of claim 33, wherein:

the reticle-support member is coupled to an arm mechanism configured to move in each of X-, Y-, and Z-directions; and

the placing steps and moving step each comprise moving the reticle-support member as required using respective movements of the arm mechanism.